REMARKS

Claims 1-19 are pending and presented for review. Favorable reconsideration and allowance are requested in light of the remarks which follow.

1. Prior Art Rejections

The Examiner rejects claims 1-12 under 35 U.S.C. § 103(a) as being obvious over U.S. Patent No. 7,171,866 to Fervers ("Fervers") in view of U.S. Patent No. 5,177,386 to Shimada ("Shimada"). Applicant disagrees with the Examiner's rejections, and as such, the rejections are respectfully traversed.

a. Recapitulation of the Invention*

The invention relates to soil compacting devices, and particularly to a vibration exciter for a vibration plate-type soil compacting device.

Traditional vibration plate-type soil compacting devices use imbalanced shafts to generate vibrations using centrifugal forces of the imbalanced shafts. Each of the imbalanced shafts has a stationary imbalance mass and a movable balance mass. Some machines can be propelled forward or reward by a adjusting the positions of thee movable masses to generate force vectors with forward or rearward components. To bring the soil compacting device to a standstill, the movable balance masses are set to create a resultant force extending exclusively in the vertical direction. While this adjustment terminates forward or rearward propulsion forces, it results in the imposition of a very strong compacting force (a maximum compacting force) to the soil while the compacting remains at a standstill. The imposition of a maximum compaction force to the same location while the machine remains standing still for a period of time can lead to over-compaction of the soil at that location.

In the present invention, when it is desired to stop propelling the machine, the positions of the movable imbalance masses in relation to the imbalance shafts that support them are adjusted such that the centrifugal forces produced by the imbalance masses at least essentially cancel each other out as a whole in each rotational position of the imbalance shafts. Thus, while each imbalance mass in itself may produce a centrifugal force, the relative positions of the movable imbalance

* This Section 1(a) is presented for background purposes so the Examiner may understand the state of the art and, in general terms, the Applicant's contribution thereto. It is not intended to particularly address the traversal of any particular rejection. That task instead is performed in Section 1(b) below.

masses are adjusted so that the centrifugal forces generated by rotation of the imbalance masses compensate one another in the overall sum. As such, while the machine operates at a standstill position with the imbalance shafts rotating, the vibration exciter produces virtually no or no aggregate vibrations.

Stated another way, and as more positively recited in amended claim 11, the adjustment device selectively adjusts the positions of the movable imbalance masses relative to their associated imbalance shafts and relative to one another so that the exciter alternatively and selectively operates in first and second modes. In the first mode, the centrifugal forces generated by the imbalance masses during rotation of the imbalance shafts have both aggregate vertical and horizontal components, thereby propelling the exciter to move forwardly or rearwardly while imposing a compaction force for soil compaction. This mode is described, for example, in paragraphs 35-39 of the published application. In the second mode, the centrifugal forces produced by the imbalance masses during the rotation of the imbalance shafts at least essentially cancel each other out as a whole in each rotational position of the imbalance shafts and, therefore, have virtually no or no aggregate horizontal or vertical components. This mode is described, for example on Paragraphs 28-30 of the published application.

In addition, when, for example, the exciter is switching between the first and second operating modes to cease machine propulsion, the adjustment device controls a change of the relative positions of movable imbalance masses relative to the imbalance shafts in such a way that the magnitude of an overall centrifugal force resulting from rotation of all of the imbalance masses is proportional to a speed of forward or backward motion of the soil compacting device while the machine is decelerating. This "transitional control" is described, for example, on Paragraphs 43 and 44 of the published application.

b. Traversal of the Rejection

In the Office Action, the Examiner indicates that Fervers discloses individual adjustment of the movable imbalance masses. Col. 2, lines 50-61. However, as the Examiner acknowledged in the Office Action, Fervers fails to disclose that, during operation, the relative positions of each movable imbalance mass on the associated imbalance shaft can be adjusted using the adjustment means in such a way that the centrifugal forces produced by the imbalance masses on each imbalance shaft

cancel each other out as a whole in each rotational position of the imbalance shafts. However, indicates that Shimada discloses such operation and that it therefore would have been obvious to modify Fervers to be operable as claimed. The Examiner cites Col. 8, lines 5-12 and lines 34-49 and Figs. 4a and 5a of Shimada in support of his position.

Contrary to the Examiner's assertions, it would not have been obvious to one of ordinary skill in the art to modify Fervers to produce the claimed invention because neither Fervers nor Shimada suggests operating a soil compacting device exciter in different modes depending on whether the compaction is being propelled or standing still. To the contrary, switching between modes in Fervers is performed independently of whether or not the device is being propelled. Shimada cannot cure this deficiency because its teachings are limited to a stationary compaction device that is not self-propelled. In addition, neither reference discloses or suggests setting the magnitude of an overall centrifugal force resulting from the imbalance masses so as to be proportional to a speed of forward or backward motion of the soil compacting device while the device is decelerating.

As recognized by the Examiner, Fervers does not disclose adjustment of the position of the imbalance masses in the manner claimed. Instead, the positions of Fervers' imbalance masses are adjusted solely for the purpose of selecting amongst a number of preset vibration patterns. The described patterns are results of special adjustments in order vary the vibratory force between a maximum and a minimum. These variations and the resulting compaction effects are in no way tied to or dependent on whether the machine is being propelled or standing still. Hence, even if the masses are adjusted to produce a relatively low vibration, a non-negligible compaction effect is still imposed when the machine is at a standstill, potentially resulting in over-compaction over the course of time. This effect is illustrated in both FIGS. 2 and 4 of Fervers.

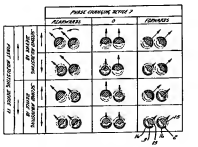


FIG. 2

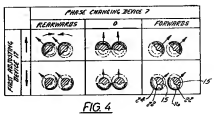
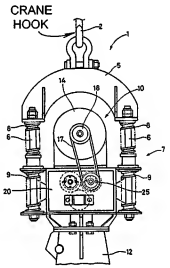


FIG. 4

Only improper hindsight reconstruction of application's own invention would have led one of ordinary skill in the art to combine Shimada and Fervers so as to produce the claimed invention. Shimada is directed to a vibrating pile driver or a similar *stationary* device and not to a mobile ground traversing soil compacting device, in which the entire vibrating pile driver device is suspended from a crane during use as shown in Fig. 3 shown below and annotated for your reference. Shimada discloses that "the vibrating pile driver 1 comprises a hanger 5 provided with a sling portion where a hook 2, which is a hanging means adopted by a crane or the like, is hooked." (Col. 5, Lines 1-3). In other words, Shimada discloses that the vibration device thereof must not travel in a forward, backward, or even a traverse motion.



the Shimada patent
FIG. 3 annotated

Shimada sets its imbalanced masses to cancel each other out only for a very device-specific reason not applicable to a vibrating plate machine of the type disclosed by Fervers. Specifically, pile drivers and other large stationary vibrating devices draw tremendous amounts of power, particularly at start-up. According to Shimada's text:

> Furthermore, in a vibration generator such as this, the driving power required to rotate the eccentric weights at rest at the initial stage of the operation is extremely large as compared with the driving power required to rotate the weights which have once arrived at the rated revolution thereof. Accordingly, if the driving power required to rotate the eccentric weights at rest before bringing them to the rated revolution could be reduced, it should be possible to implement the miniaturization of the driving power source such as a motor, thereby improving significantly the utilization efficiency of energy such as power to be consumed. Therefore, there is a strong demand that a method should be implemented thereby to reduce with ease the driving power required for the revolution of the rotational shafts at the initial stage of the operation.

Col. 1, lines 47-60.

> Therefore, at the time of actuating the vibration generator 10, for example, the phase difference between the first and second fixed eccentric weights 51A and 52A and the first and second movable eccentric weights 51B and 52B, which are on the same shaft themselves, are defined as 180 degrees as shown in FIG. 4A, such state becomes the same as in the case of actuating a well-balanced flywheel. Then, the phase difference is gradually reduced from 180 degrees to zero degree by shifting the phase adjustment shaft 23 during the period that the electric motor 14 reaches its rated revolution subsequent to its actuation. Hence it becomes possible to rotate each of the eccentric weights smoothly without a great driving power; thus a smaller electric motor 14 can serve its purpose sufficiently, leading to the implementation of the energy saving.

Coll. 8, lines 33-49.

There is no evidence in the prior art that the relatively small hand operated vibratory compacting plate of Fervers would have been appreciably benefitted by causing the vibrations generated by its imbalance masses to offset each other at startup. Nor is there any indication in the art that the advantage produced by the invention, namely, the ability to selectively not compact soil while the vibratory compacting plate is operating. As such, applicant submits that only improper hindsight reconstruction of applicant's own device would have led a routineer to combine Fervers and Shimada as proposed by the Examiner. A sustainable rejection based on obviousness cannot be supported on such a weak foundation.

Further, Shimada teaches the desirability of configuring its imbalance masses for simultaneous or synchronous adjustment to keep the resulting vector vertical at all times. This adjusting the masses individually, as in the claimed invention, proceeds contrary to the clear teachings of Shimada.

Further, Applicant believes that the Examiner is in error with respect to the interpretation that Figs. 4A-4C show the movable masses rotated 90 degrees with respect to the shaft. Rather, Fig. 4C shows the movable masses rotated to 0 degrees with respect to the shaft and by proxy the stationary mass. While it is true that Fig. 4B shows the movable mass at 90 degrees with respect to the shaft, Shimada fails to teach that this may be done to effect movement in one of the forward and rearward directions and further does not show rotation in the opposite direction to effect movement in the other of the forward and rearward direction.

Even if one were to have followed the purported teachings of Shimada and to selectively control Fervers's machine to produce virtually no or no vibrations, nothing short of improper hindsight reconstruction of applicants' own invention would have suggested doing so when the machine is operating at a standstill and to produce vibrations when the machine is being propelled.

Finally, nothing in Fevers or Shimada remotely suggests setting the magnitude of an overall centrifugal force resulting from the imbalance masses so as to be proportional to a speed of forward or backward motion of the soil compacting device as recited in claim 1 or in setting the forces in this manner when transitioning between the first and second operating modes as recited in claim 13. Indeed, as stated above, Shimada's teachings are limited to a *stationary* device.

Claims 2-10 recite additional features of the invention which, when considered in combination with those of claim 1, are neither disclosed nor suggested by the cited prior art.

For instance, contrary to the Examiner's assertions, nothing in Shimada suggests adjusting the positions of centrifugal masses to cancel each other out *during a transition between forward and backward motion*. Shimada's device is *stationary* and, accordingly, provides no guidance whatsoever in determining how to control a device during a transition between forward and backward motion.

New apparatus claim 15 and method claim 17, like claim 11, both recite controlling an exciter of a vibration plate in the first and second distinct modes recited in claim 11. No such control is disclosed or suggested in the cited prior art claims a method of operating a vibration exciter of a soil compacting device, the steps of which are commensurate with the functions recited in claim 11. Neither Fevers nor Shimada discloses such operation. Moreover, since neither reference addresses the problem addressed and solved by the present invention (the avoidance of soil over-compaction while compacting at a standstill), nothing short of improper hindsight reconstruction of applicants' own invention would have lead one of ordinary skill in the art modify Fervers to operate as claimed.

New dependent claims 13, 14, 16, and 19 highlight another difference between Fervers and the present invention. In the present invention, both the vibration vector or vertical component of the vibration and the travel vector or the horizontal component of the vibration can be adjusted solely by adjustment of the movable masses relative to the imbalance shafts through an angle of ± 90 degrees. The phases of the imbalance shafts therefore can be fixed relative to one another, as is the case in the disclosed embodiment and specified in the newly added dependent claims. In Fervers, movement of the imbalance masses relative to the imbalance shafts from 0 to 180 degrees primarily adjusts the vibration vector without significantly impacting the travel vector. The travel mode instead is adjusted by adjusting the phase of one of the imbalance shafts 3 relative to the other shaft 2 using a phase changing device 7. See Col. 4, lines 6-54 and Col. 5, lines 57-61. The invention requires no phase changing device. Since Shimada relates exclusively to a stationary compaction device, nothing in it could suggest modifying Fervers to meet the limitations of 13, 14, 16, and 19.

In light of the foregoing, it is submitted that claims 1-19 are in condition for allowance, and a notice to this effect is respectfully requested.

Conclusion

Applicant asserts that claims 1-19 are in compliance with 35 U.S.C. §§ 102, 103, and 112, and each defines patentable subject matter. A Notice of Allowance is therefore respectfully requested.

The Director is hereby authorized to charge Deposit Account No. 50-1170 in the amount of $220 for the submission of one additional independent claim in excess of three for a large entity. The Office is also hereby authorized to direct payment of any other fees that may be deemed payable in conjunction with this or any future communication, or credit any overpayment to Deposit Account No. 50-1170.

The Examiner is cordially invited to contact the undersigned by telephone if any informal matters remain which would hinder or otherwise delay passage of this matter to issuance.

Respectfully submitted,

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